Accredited Laboratory

A2LA has accredited

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.

Youngstown, PA

for technical competence in the field of

Chemical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of R223 – Specific Requirements: GE Aviation S400 Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 30th day of September 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 0621.02
Valid to September 30, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Chemical Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.
221 Westmoreland Drive
Youngstown, PA 15696
Charles Connors Jr. Phone: 724 537 3131
E-mail: c.connors@wmtr.com

CHEMICAL

Valid To: September 30, 2023 Certificate Number: 0621.02

In recognition of the successful completion of the A2LA evaluation process (including compliance to R223 – Specific Requirements – GE Aviation S-400 Accreditation Program), accreditation is granted to this laboratory to perform the following metals and fastener tests on steel, stainless steel, aluminum & alloys, nickel & alloys, titanium & alloys, cobalt & alloys, copper & alloys and magnesium & alloys:

Test:	**Test Method(s):**
Spectroscopy	
Atomic Absorption (AAS)	ASTM E34, E1184, E1834; WMT&R-5110[1]
Ag, As, Ba, Bi, Cd, Cr, Ga, Ni, Pd, Sb, Se, Sn, Ta, Te, Tl, Zn	
Combustion / Fusion (LECO)	ASTM E1019, E1447, E1409, E1941, E1947; EN 10276, 2003-10, 3976; ISO 671; WMT&R-5168[1], WMT&R-5161[1]
C, H_2, N_2, O_2 & S	
ICP - AES	ASTM E2371, E2594, E3061; WMT&R-5900[1]
Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Li, Lu, K, Mg, Mn, Mo, Na, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Rh, Ru, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Tc, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr	
ICP - MS	ASTM E2823; WMT&R-5925[1]
Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Li, Lu, K, Mg, Mn, Mo, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Rh, Ru, Sb, Sc, Se, Si, Sm, Sn, Sr, Tb, Tc, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr	
Optical Emission Spectroscopy (OES)	ASTM E415, E1086, E1251, B954, E3047, E2994; WMT&R-5173[1]
Al, B , Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Fe, Ga, Gd, La, Li, Mg, Mn, Mo, Na, Nb, Nd, Ni, P, Pb, Pr, S, Sb, Si, Sn, Sr, Ta, Te, Th, Ti, V, W, Y, Yb, Zn, Zr	

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Test:	**Test Method(s):**
Spectroscopy continued	
XRF	ASTM E1621, E1085. E572, E2465, E539
Al, Be, Bi, Ca, Co, Cr, Cu, Fe, Ga, Li, Mg, Mn, Mo, Nb, Ni, P, Pb, Pd, Ru, Sb, Si, Sn, Sr, Ta, Ti, V, W, Y, Zn, Zr	
Additive Manufacturing Testing	
Apparent Density	ASTM B212, B417
Flow Rate	ASTM B213, B964
Particle Size Distribution	ASTM B822
Sieve Analysis	ASTM B214
Tap Density	ASTM B527

[1]In-house method.

Accredited Laboratory

A2LA has accredited

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.

Youngstown, PA

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of R223 – Specific Requirements: GE Aviation S400 Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 30th day of September 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 0621.01
Valid to September 30, 2023

For the types of tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

WESTMORELAND MECHANICAL TESTING & RESEARCH, INC.[1]
221 Westmoreland Drive
Youngstown, PA 15696
Charles Connors Jr. Phone: 724 537 3131
E-mail: c.connors@wmtr.com

MECHANICAL

Valid Until: September 30, 2023 Certificate Number: 0621.01

In recognition of the successful completion of the A2LA evaluation process (including compliance to R223 – Specific Requirements – GE Aviation S-400 Accreditation Program), accreditation is granted to this laboratory at the location listed above as well as the one satellite laboratory location listed below to perform the following tests on aircraft components, automotive components, fasteners, metals & alloys, and plastics & polymers:

Test:	**Test Method(s):**
Bearing Strength	ASTM E238
Compression	ASTM E9
Elevated Temperatures with Conventional or Rapid Heating Rates and Strain Rate	ASTM E209
Environmental Simulation	
CASS	ASTM B368
Corrosion Testing	
Exfoliation Corrosion	ASTM G34, G66
Visual Assessment of Exfoliation Corrosion Susceptibility of 5xxx Series Aluminum Alloys (ASSET Test)	ASTM G66
Intergranular Corrosions Susceptibility	ASTM A262 (Methods A & E), G28, G67; ISO 3651-1, 3651-2
Determining the Susceptibility to Intergranular Corrosion of 5xxx Series Aluminum Alloys by Mass Loss after Exposure to Nitric Acid (NAMLT Test)	ASTM G67
Pitting & Crevice Corrosion Susceptibility	ASTM G48
Stress Corrosion Cracking Susceptibility	ASTM G38, G39, G44, G47, G49
Humidity Exposure	MIL-STD-1312-3; NASM-1312-3
Salt Spray (Fog)	ASTM B117, G85; NASM 1312-1
Modified Salt Spray (Fog) Testing	ASTM G85
Drop Weight	ASTM E208
Dynamic Tear Strength	ASTM E604
Ductility (Bend)	ASTM E190, E290

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Test:	**Test Method(s):**
Electrical Conductivity	ASTM E1004
Fatigue	
Crack Growth	ASTM E647; AITM 1-0042
Low/High Cycle, Axial, Flexural, Rotating Beam	ASTM E466, E606; NASM-1312-11; ISO 1143; EN 6072
Fracture Toughness Testing	ASTM E399, E1820; EN 2002-23; ISO 12737
Fracture Testing of Surface-Crack Tension Specimens	ASTM E740/E740M
K-R Curve Testing	ASTM E561, AITM 1-0043
Plane-Strain (Chevron-Notch) Fracture Toughness	ASTM E1304
Hardness Testing	
Brinell (10 mm – 500 & 3000 kg)	ASTM E10
Rockwell (A, B, C, E, F)	ASTM E18; NASM-1312-6
Superficial (15, 30, 45 N & T)	ASTM E18; NASM-1312-6
Vickers (5, 10) kg	ASTM E92; ISO 6507
Microhardness Knoop (10, 25, 50, 100, 200, 300, 500, 1000) gf Vickers (10, 25, 50, 100, 200, 300, 500, 1000) gf	ASTM E384; NASM-1312-6
High Pressure (Hydraulic) Burst	ABM 2-3026; AMS 4081, 4083, 4071; MIL-T-7081D; WMT&R-6900[2]
Impact (Charpy, Izod)	ASTM E23, A370
Jominy	ASTM A255
Metallographic Evaluation	
Alpha Case	WMTR-7003; GE P3TF19, GE P3TF32; EN 2003-9
Characterization of Particles	ASTM F1877
Delta Ferrite	AMS 2315
Depth of Decarburization	ASTM E1077; SAE J121; ISO 3887
Detecting Detrimental Intermetallic Phase in Duplex Austenitic / Ferritic Stainless Steels	ASTM A923 (Method A)
Detection of Cuprous Oxide in Copper	ASTM B577
Determination of Beta Transus in Titanium	EN 3684
Grain Size, ALA Grain Size	ASTM E112, E930, E1181; ISO 643; E50TF133
Inclusion Content	ASTM E45 (Methods A & D); DIN EN 2951
Macro Examination	E340, E381, A604; AMS 2643
Microetching and Identification of Microstructures	ASTM E407; ASM Metals Handbook Vol. 9
Microstructure Characterization of Welded Aluminum Structure	AITM 4-0002
Microstructure of Graphite in Iron Castings	ASTM A247
Microstructure of High Carbon Bearing Steels	ASTM A892
Plating Thickness	ASTM B487; NASM-1312-12
Preparation	ASTM E3
SEM with Energy Dispersive Spectroscopy	ASTM E1508; WMT&R-7302[2]
Surface Finish	ASME B46.1
Volume Fraction	ASTM E562, E1245; E50AD001; EN 3683

Test:	**Test Method(s):**
Shear / Double Shear	ASTM F606/F606M; NASM-1312-13, 1312-20
Shear Testing of Aluminum Alloys	ASTM B769, B831
Stress Durability (Hydrogen Embrittlement)	NASM-1312-5
Tensile	ASTM E8/E8M, E21; EN 2002-1; ISO 148-1, 6892-1
Tensile (1,000,000 lbs capacity)	ASTM A370, D638, E8/E8M, E21
Wedge, Axial and Proof Load	ASTM F606/F606M, E111; NASM-1312-8, 1312-18
Tensile Properties of Aluminum and Magnesium Alloy	ASTM B557
Tensile Plastic Strain Ratio (r) and Strain-Hardening Exponents (n-Values) of Metallic Sheet Materials	ASTM E646, E517; ISO 10113, 10275
Weld Operator and Procedure Qualification Testing	AWS D1.1, D1.2, D1.5, D4.0; ASME Sec. IX

I. Dimensional Testing[3]:

Parameter	Range	CMC[4] (±)	Equipment
Linear	Up to 3 in Up to 12 in Up to 1 in Up to 1 in Up to 1 in Up to 21 mm X:15 in, Y:18 in, Z:12 in X:1 in, Y:15 in X: 8 in, Y: 4 in	0.00016 inch 0.001 inch 0.0003 inch 0.0005 inch 0.00002 inch 0.0002 mm 0.0002 inch 0.00008 inch 0.00014 inch	Digital Micrometers Digital Calipers Dial Indicators Height Gauge (analog) Laser Micrometer Scanning Electron Microscope CMM RAM Optical Optical Comparator
Angle	Up to 180°	18 minutes	Optical Comparator
Radii	Up to 10 in	0.0004 in	Optical Comparator

Buildings AP14 and AP209

Test:	**Test Method(s):**
Bearing Strength	ASTM D5961/D5961M, D953, E238; AITM 1-0009, 1-0065
Coefficient of Friction (Composites)	ASTM D1894
Conditioning (Composites)	ASTM D5229
Constituent Content	ASTM D3171 (Method I – Procedure A, B, C, D, E, F, G), D3529; EN 2557, 2558, 2559
Compression	ASTM E9, E209; EN 2850; ISO 14126-2; AITM 1-0008
Strain Measurement	ASTM D695, D6641/D6641M; ISO 604, 14126
Plain, Open Hole and Filled Hole	ASTM D6484/D6484M
Edgewise / Flatwise Sandwich	ASTM C364/C364M, C365/C365M
Shear Loading	ASTM D3410/D3410M
Compression Set	ASTM D395
Compression After Drop Weight	ASTM D7136, D7137
Miscellaneous Compression	ASTM C1424, D1621
Electrical Conductivity	ASTM E1004
Fatigue	
Ambient & Non-Ambient	ASTM E466, E606; EN 6072; ISO 1099; NASM 1312-11
Flexural	ASTM D7774
Uniaxial	ASTM D7791
Crack Growth Rate (FCGR)	ASTM E647
Flammability	
Cabin and Cargo Component Materials	AMFTH CH 1, 2, 3
Flexural	
Ambient & Non-Ambient	ASTM C393, C1161, C1341, D6272, D6415, D7249/D7249M, D7250, D790, D7264; EN 2562, 2476; ISO 178, 14125; AITM 1-0018
Fracture Toughness	ASTM E399, E1820
Determination of the Opening Mode I	ASTM D5528
Determination of the Opening Mode I Interlaminar Fracture Toughness, GIc, of Continuous Fiber-Reinforced Composite Materials	ASTM D5528; EN 6033; AITM 1-0005, 1-0053

Test:	**Test Method(s):**
Fracture Toughness continued	
K-R Curve Testing	ASTM E561
Mixed Mode	ASTM D6671/D6671M (Propagation Option Only)
Mode II Interlaminar Unidirectional	ASTM D7905/D7905M
Plane-Strain Fracture Toughness	ASTM D5045, C1421
Hardness	
Shore Hardness (A, D, M)	ASTM D2240
Barcol Hardness	ASTM D2583
Brinell (10 mm – 500 & 3000 kg; 2.5 mm – 187.5 kg)	ASTM E10; ISO 6506
Rockwell (A, B, C, E, F)	ASTM E18; NASM-1312-6
Superficial (15, 30, 45 N & T)	ASTM E18; NASM-1312-6
Impact	
Charpy / IZOD Impact	ASTM E2248, D256, D4812, D5420, D6110, D7766; ISO 179, 180
Metallographic Evaluation	
Alpha Case	WMTR-7003[2]; GE P3TF19, GE P3TF32; EN 2003-9
Depth of Decarburization	ASTM E1077; SAE J121; ISO 3887
Detecting Detrimental Intermetallic Phase in Duplex Austenitic / Ferritic Stainless Steels	ASTM A923 (Method A)
Detection of Cuprous Oxide in Copper	ASTM B577
Determination of Beta Transus in Titanium	EN 3684
Grain Size	ASTM E112, E930, E1181; ISO 643; E50TF133
Inclusion Content	ASTM E45 (Methods A & D); DIN EN 2951
Macro Examination	E340, E381, A604; AMS 2643
Microetching and Identification of Microstructures	ASTM E407; ASM Metals Handbook Vol. 9; EN 3114
Microstructure Characterization of Welded Aluminum Structure	AITM 4-0002
Microstructure of Graphite in Iron Castings	ASTM A247
Microstructure of High Carbon Bearing Steels	ASTM A892
Plating Thickness	ASTM B487; NASM-1312-12
Preparation	ASTM E3
Volume Fraction	ASTM E562, E1245; E50AD001; EN 3683
Peel	
Adhesive Peel	EN 2243-1, 2243-2, 2243-3
Climbing Drum Peel	ASTM D1781
T-Peel	ASTM D1876
Floating Roller Peel	ASTM D3167
Peel (180º)	ASTM D903
Pull-Through Resistance	ASTM D7332; AITM 1-0066
Residual Stress by Hole Drilling Strain Gauge	ASTM E837

Test:	Test Method(s):
Shear	
Core Shear (-320 to 572) °F	ASTM C273/C273M
Ambient Temperature by SBS	ASTM D2344/D2344M; ISO 14130; EN 2377, 2563
Ambient Temperature ±45 º Tension	ASTM D3518/D3518M; ISO 14129; AITM 1-0002
Ambient Temperature by Compression	ASTM D3846
Ambient Temperature by V Notch	ASTM C1292, D7078/D7078M, D5379
Plane -Strain Fracture Toughness	ASTM D5045
Lap Shear, Double Lap	ASTM D1002, D3163, D3164, D3165; D3528; EN 2243-1, 2667-1; AITM 1-0019
Shear by Punch	ASTM D732
Shear Testing of Aluminum Alloys	ASTM B831
Specific Gravity / Density	ASTM B311, C693, D792; ISO 10119, 1183-1
Stress Durability (Hydrogen Embrittlement)	ASTM F519; NASM-1312-5
Stress Rupture / Creep	ASTM E139, E292, D2990
Tear	ASTM D1004, D1938
Tensile	ASTM A370, C1237, C1275, C1359, D638, D882, D3039, D5766, D6742, E8/E8M, E21, E111, B557, F606/F606M; ISO 6892, 527; NASM 1312-8; EN 2561, 2597, 2747; AITM 1-0007, 1-0029
Flatwise Tension	ASTM C297, D7291; EN 2243-4; AITM 1-0025
Vulcanized Rubber / Thermoplastic Elastomers	ASTM D412, (Except for Method A Straight and Method B Ring Specimens)
PTFE	ASTM D1708
Thermal Analysis	
DMA (Dynamic Mechanical Analysis)	ASTM D7028
DSC (Differential Scanning Calorimetry)	ASTM D3418
TMA (Thermomechanical Analysis)	ASTM E831, E2092
Glass Transition (TG) Temperature	ASTM D7426, E1545, E1640; EN 6032; ISO 11357-2
Specific Heat (DSC)	ASTM E1269
Coefficient of Linear Thermal Expansion	ASTM E228
Thermal Diffusivity by the Flash Method	ASTM E1461
Water Absorption	ASTM D570; ISO-62; EN 2378

[1]This accreditation covers testing performed at the main laboratory and the satellite laboratory listed above.

[2]In-house test method.

[3]This laboratory offers commercial dimensional testing services only. These tests are not equivalent to that of a calibration.

[4]Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine measurements of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95% level of confidence, usually using a coverage factor of k = 2. The actual measurement uncertainty of a specific measurement performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific measurement.